Anritsu

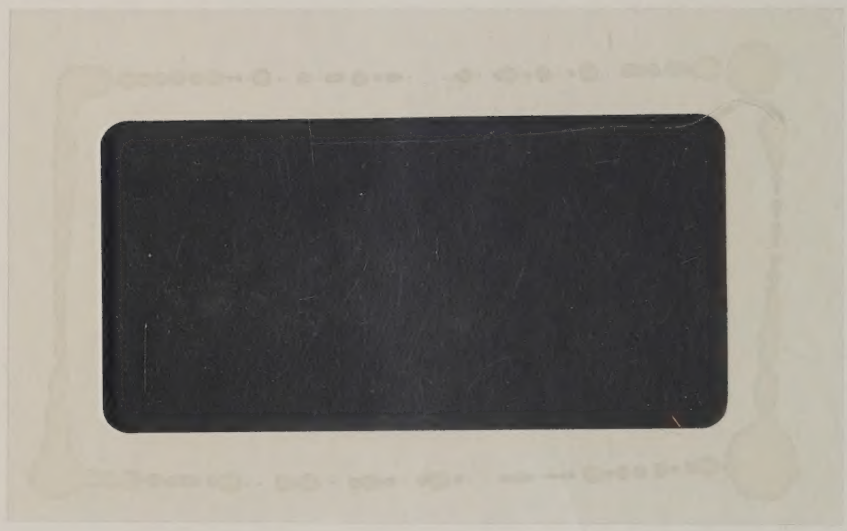
MX3512A

π/4DQPSK Analysis Software

Operation Manual

MP MASTER

MA35885



MX3512A

π/4DQPSK Analysis Software

Operation Manual

First Edition

Measuring Instruments Division
Measurement Group

ANRITSU CORPORATION

APR.
995

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MX3512A π/4DQPSK Analysis Software
Operation Manual

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ABOUT THIS MANUAL

(1) MX3512A π/4DQPSK ANALYSIS SOFTWARE and copying prohibition

MX3512A π/4 DQPSK Analysis Software tests transmitters which employ the PDC (Personal Digital Cellular), PHP (Personal Handy Phone), or NADC (North American Digital Cellular) method. This software uses PTA (Personal Test Automation) which has been mounted on the MS8604A Digital Mobile Radio Transmitter Tester.

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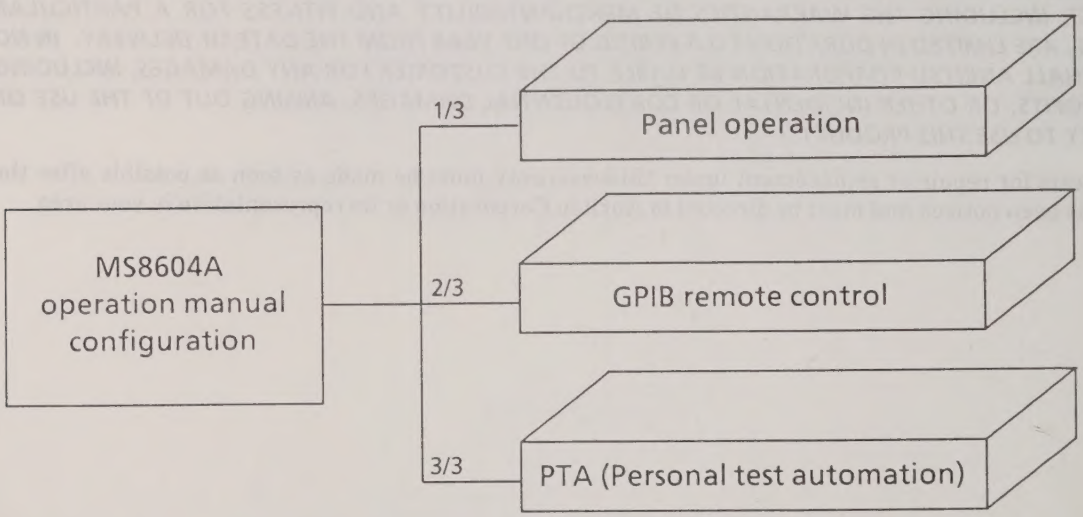
(2) Introduction to related operation manuals

Since this software uses the PTA function, which is provided as standard in the MS8604A, the operation manuals shown below must be referred to for details of the MS8604A operation, PTA programming, and remote control through GPIB.



Basic operation:	The MS8604A operation manual includes details of the following information: General, Specifications, Preparation before usage, Panel explanation, Manual operation (local operation), Storage/shipping, Function key transition diagram, Initial setting list/error messages, etc.
GPIB remote control operation:	Since the MS8604A conforms to IEEE488.2, GPIB remote control is described in the explanations referring to IEEE4888.2. Program examples use the N_{88}-Basic language of NEC PC9800 Series personal computers.
PTA personal test automation:	How to program in the PTL high level language to process high-speed controls and calculations that are link directly to the measurement systems is explained. The programming is executed by PTA (Personal Test Automation), which is the MS8604A built-in personal computer. This promotes measurement automation together with GPIB.

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SECTION 1
GENERAL

1.1 Radio System Objective

This application software uses the MS8604A Digital Mobile Radio Transmitter Tester and PTA (Personal Test Automation) to test transmitters which use the following systems:

- PDC (Personal Digital Cellular)
- PHP (Personal Handy Phone)
- NADC (North American Digital Cellular)

1.2 Operation (Measurement) Items in the System

Measurement items:

1. Demodulation data display: One slot of data is demodulated and is displayed on the screen.
2. Vector error display: Vector errors corresponding to each symbol in one slot are displayed.
3. Phase error display: Phase errors corresponding to each symbol in one slot are displayed.
4. Amplitude error display: Amplitude errors corresponding to each symbol in one slot are displayed.
5. Eye pattern display: Both I and Q of the eye pattern are displayed at one time.

1.3 Standard Configuration

The standard configuration of this software is shown below.

Item	Model/order number†	Name†	Quantity
Software	MX3512A	π/4 DQPSK analysis software	1
Accessory	W0797AE	Operation manual	1

† Please specify model/order number, name, and quantity when ordering.

1.4 Precautions before using the application software

Before usage of the application software, the following items are explained.

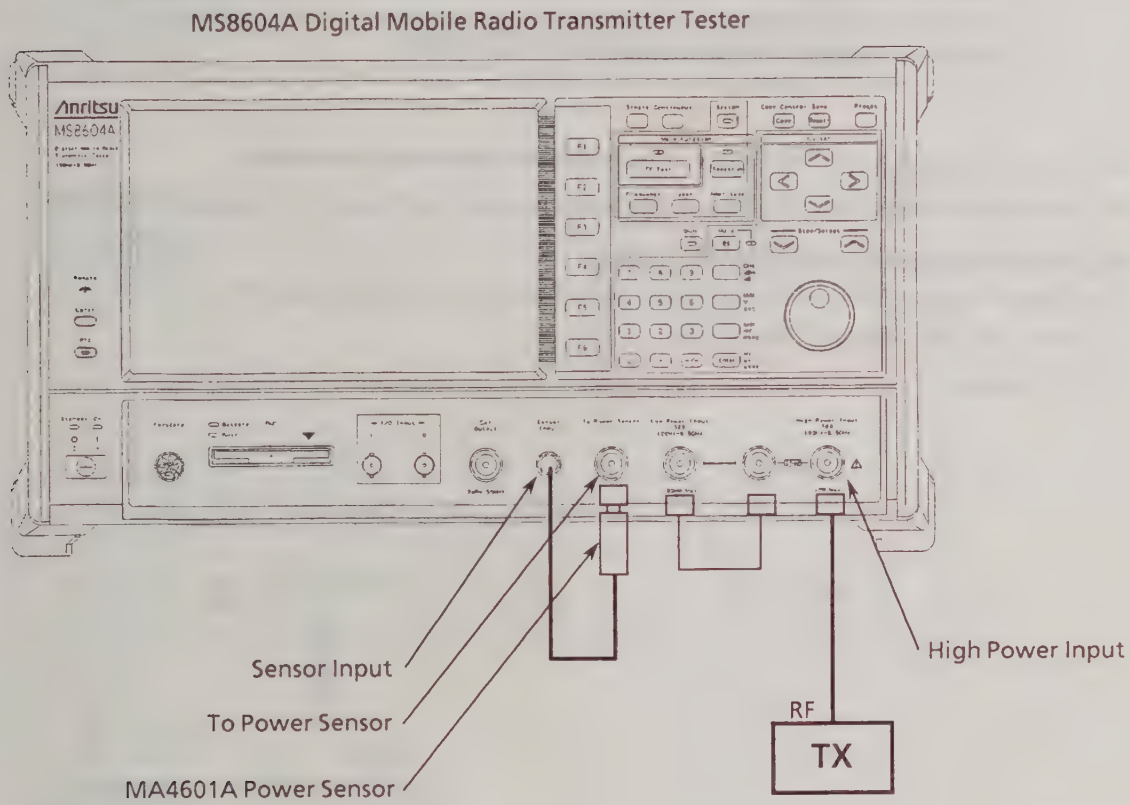
- Printer presetting
- MS8604A set-up
- Over power caution
- Precautions when handling PMC memory media

1.4.1 Printer presetting

To output hard copies of waveforms and parameters etc. displayed on the MS8604A screen during or after measurement, paper setting and printer address setting are necessary in advance.

1.4.2 MS8604A set-up

Before testing by this application software, set up the MS8604A and transmitter under test (TX) as shown below.



1.4.3 Over power caution

The MS8604A Low Power Input and High Power Input connectors are not provided with any circuits to protect from over power.

Do not apply 10 W or greater transmitter power to the High Power Input connector, or 100 mW or greater transmitter power to the Low Power Input connector at any time.

1.4.4 Precautions when handling PMC memory media

Caution

Do not pull the plug-in memory card out of the equipment (MS8604A) when it is in use. When the equipment is being accessed, the equipment BUSY lamp lights. If it is pulled out, data in the memory card will be damaged.

The Plug-in Memory Card (PMC) is the memory medium used for this software.

The important memory contents of this memory medium may be damaged by mis-use or by faults.

Anritsu will not guarantee against memory loss.

The precautions are explained for handling plug-in memory in the following cases:

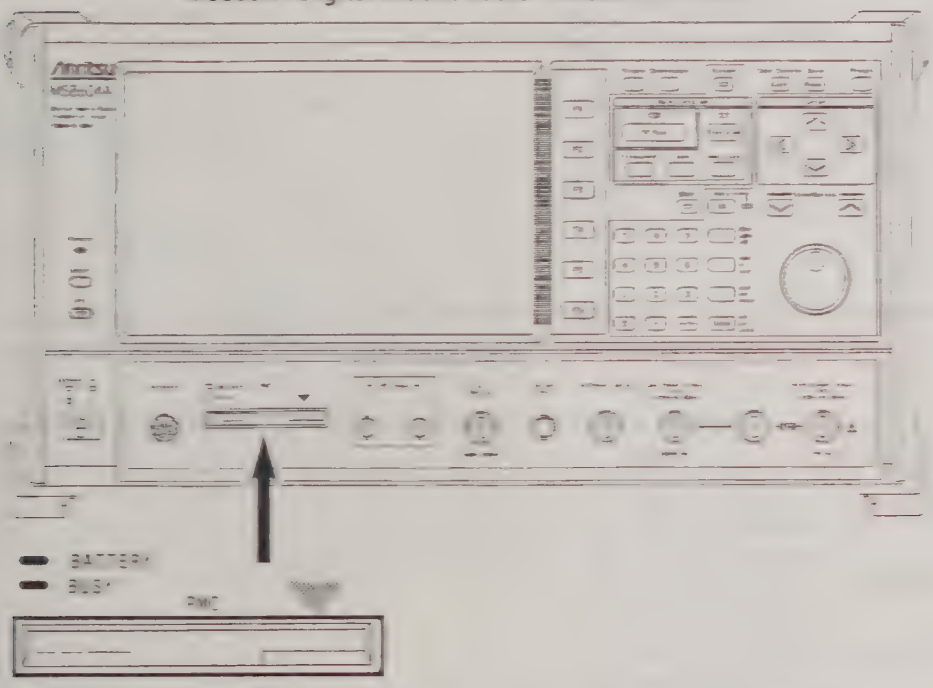
- Inserting into the MS8604A mainframe
- PMC handling

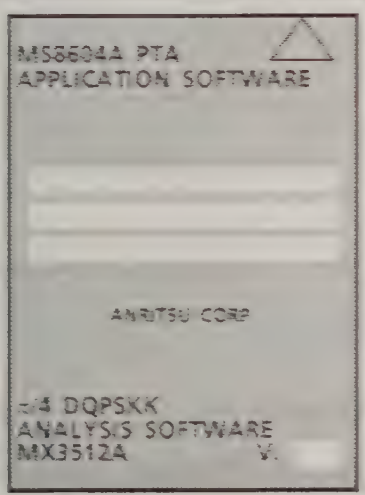
(1) Inserting the PMC into the MS8604A mainframe

Caution

The PMC punch polarity will be damaged if it is inserted too forcefully.
Insert the card according to the following guidance:

MS8604A Digital Mobile Radio Transmitter Tester





1. Ensure that the green triangle arrow mark is on the top side.
2. Hold the PMC horizontally and align it with the arrow mark on the MS8604A. Confirm that when the PMC is held next to the slot, the PMC triangle mark and the triangle mark on the MS8604A correspond exactly.
3. Insert the PMC slowly and horizontally into the slot as far as it will go.

Note: The PMC connector will be damaged if it is inserted with excessive force.

Insert the PMC into the MS8604A mainframe correctly by following the above procedure.

(2) PMC handling

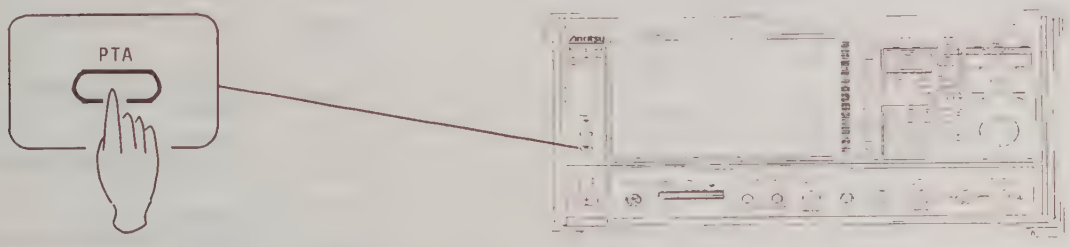
1) Do not give any strong shocks to the PMC by dropping it or by bending it.
2) Do not dip it in water.
3) Do not expose it to high temperature, high humidity, or direct sun light.
4) Do not insert tweezers, etc. into the PMC connector section.
5) Do not allow dust or dirt to enter the PMC connector section.
6) Do not insert anything other than the specified plug-in memory card into the PMC slot.

SECTION 2
PREPARATION BEFORE PROGRAM EXECUTION

2.1 Loading Program

Press the power supply switch on the MS8604A front panel to turn the power on. Insert the plug-in memory (PMC) into the slot in the MS8604A mainframe.

Press the PTA key on the MS8604A front panel to turn the PTA on.



At this time, the display screen is blank, and the cursor is displayed in the HOME position (top left of the screen). Fig. 1 below shows the PTA etc (1/4) with the corresponding soft keys F1 to F6.

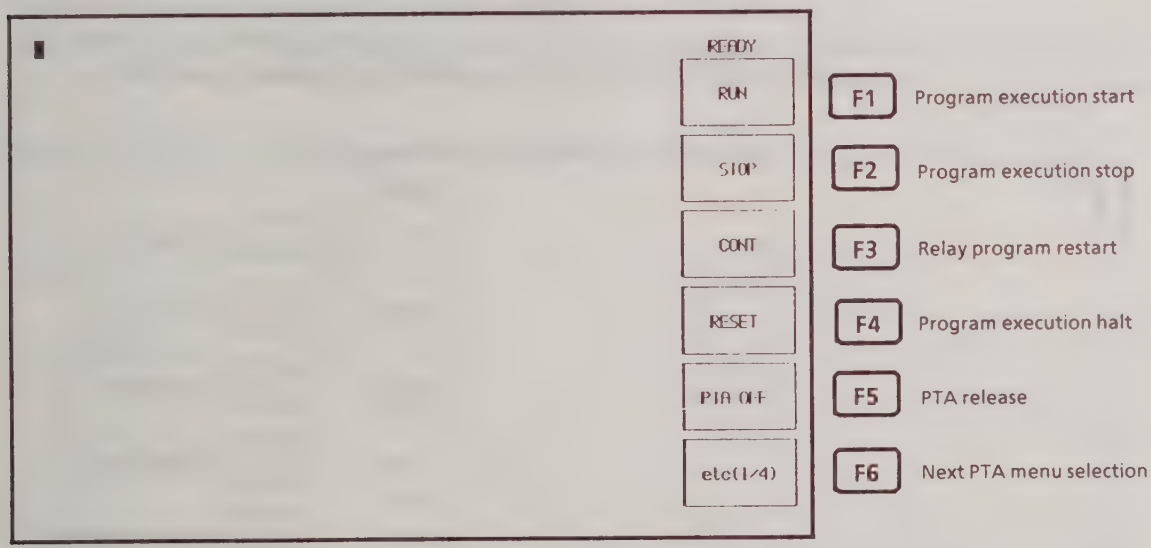


Fig. 1 PTA etc (1/4) Menu Screen

Note: • Even if the [PTA OFF: F5] soft key is pressed, the program saved in the PTA memory is not erased.
Therefore, when the PTA key is turned on again, the saved program can be used again.

• When the PTA is turned on and a new program is loaded, the previous program is erased.

In the PTA etc (1/4) menu in Fig. 1 on the previous page, when the F6 key that corresponds to the etc (1/4) label etc (1/4: F6) is pressed, the PTA etc (2/4) menu shown in Fig. 2 is displayed on the screen.

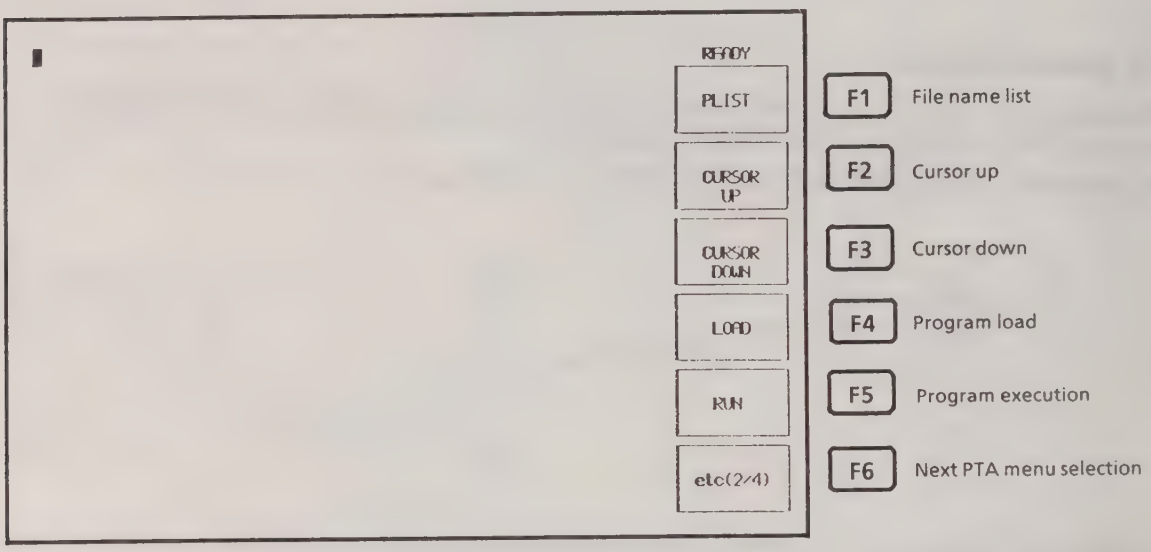


Fig. 2 PTA etc (2/4) Menu Screen

In the PTA etc (2/4) menu in Fig. 2, when the [PLIST: F1] key is pressed "MX3512" is displayed on the screen as shown in Fig. 3 below. This denotes the PTA file name MX3512 is saved in the PMC.

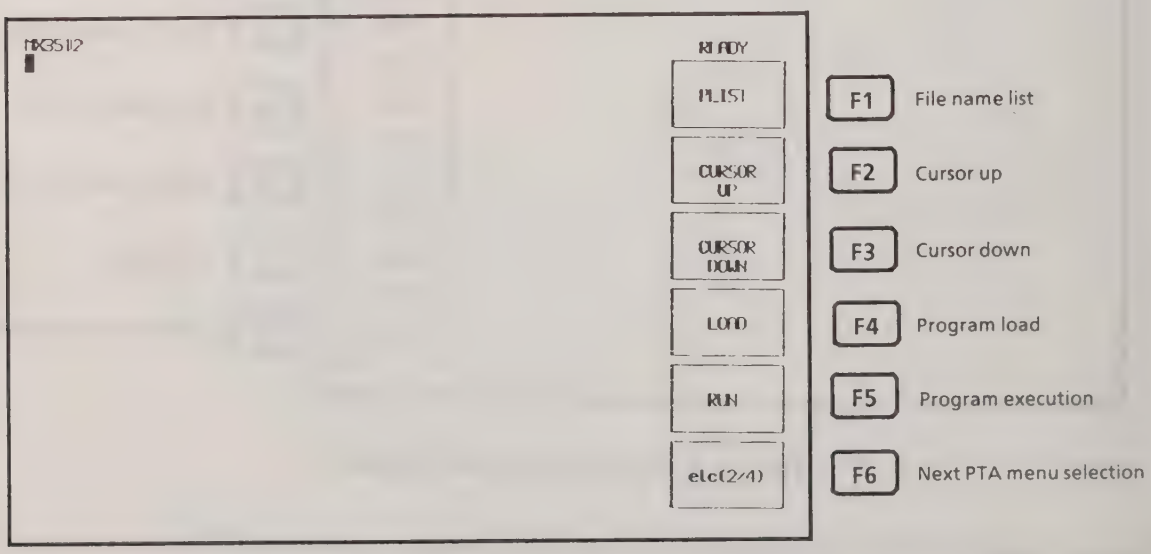


Fig. 3 PTA etc (2/4) Menu Screen when Pressing [PLIST: F1] Key

On the screen shown in Fig. 3, press the soft key [CURSOR UP: F2] or [CURSOR DOWN: F4] to move the cursor onto the MX3512A character.

Confirm that the cursor is exactly on the MX3512 character, and then press the [LOAD: F4] key. The program with the file name displayed on the line where the cursor placed is then loaded. When program load is completed, the screen shown in Fig. 4 is displayed.

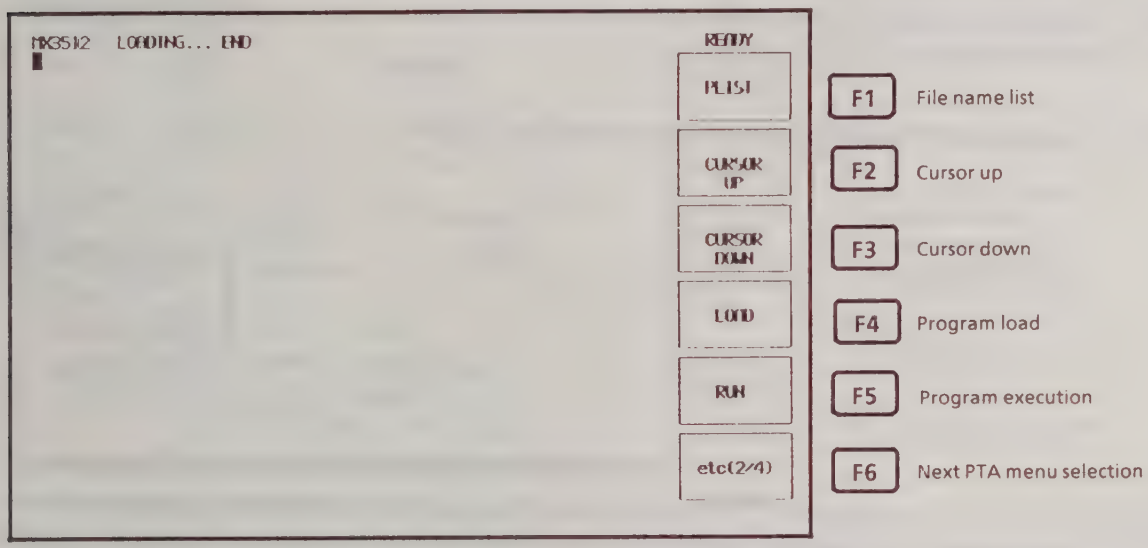


Fig. 4 Cursor Line Program Load Screen

In this way, loading the MX3512 program from the PMC is completed.

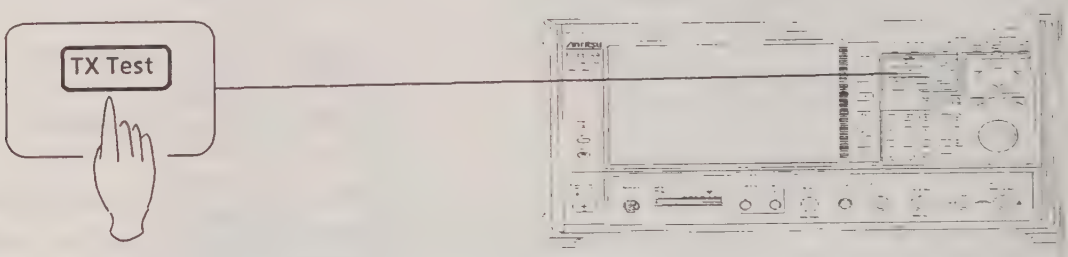
2.2 Preparation before Program Execution

Release the PTA before executing the program, then display the measurement system selection screen.

2.2.1 Releasing PTA

On the screen shown in Fig. 4, press the F6 key until the etc (1/4) label is displayed to return to the Fig. 1 PTA etc (1/4) menu screen. On the screen shown in Fig. 1, when the soft key [PTA OFF: F5] is pressed, the PTA is released.

2.2.2 Displaying measurement system selection screen



When the PTA is released, press the TX Test key on the front panel of the MS8604A mainframe. The MODE menu screen to select each of the PDC, PHP, and NADC system specification measurement modes for each system specification are displayed on the screen shown in Fig. 5.

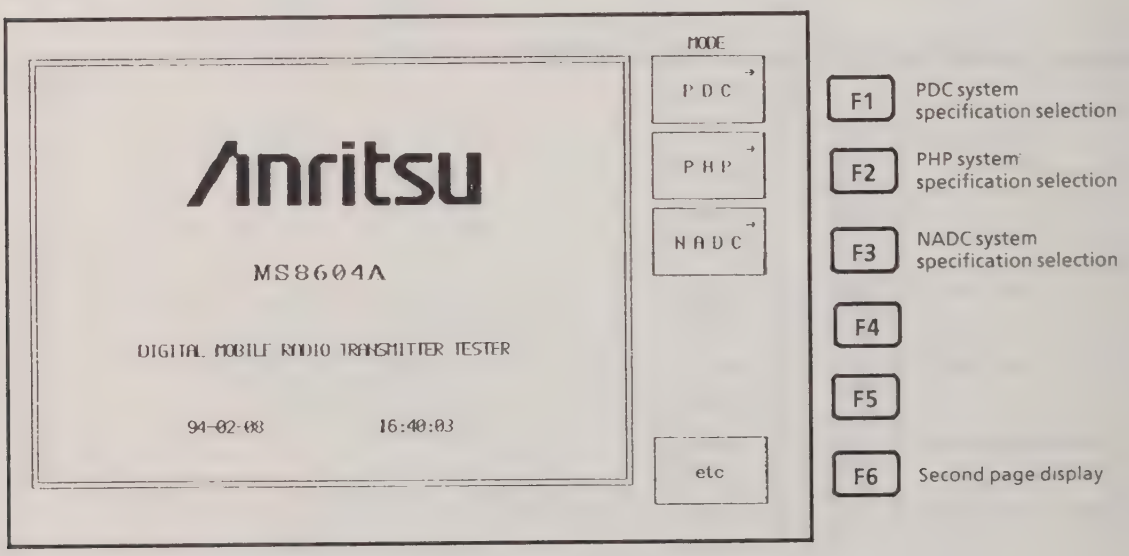


Fig. 5 Measurement System Selection Mode Menu Screen

- PDC ..... Personal Digital Cellular system specification
- PHP ..... Personal Handy Phone system specification
- NADC ..... North American Digital Cellular system specification

Select a system specification from the measurement system selection MODE menu shown in Fig. 5. System measurement set-up parameters are then displayed as shown on the screen shown in Fig. 6. Fig. 6 shows the system measurement set up parameter PDC menu is displayed by pressing the [PDC: F1] soft key in Fig. 5. The explanation hereinafter is based on this PDC specification selection screen.

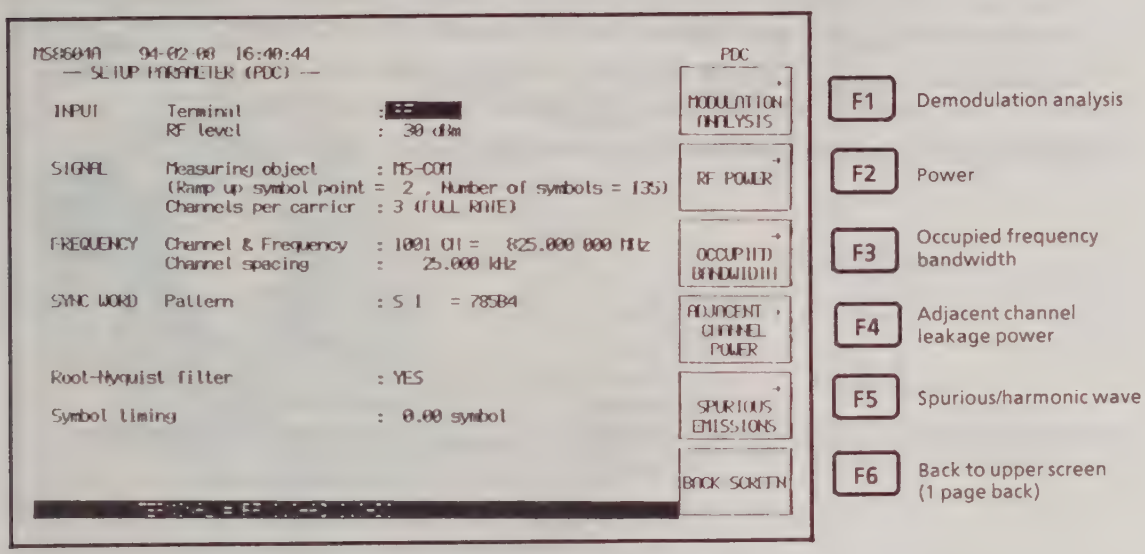


Fig. 6 System Measurement Set-up Parameter PDC Menu Screen

Specify parameters according to measurement signals to be tested, then press the [MODULATION ANALYSIS: F1] soft key. The MOD. ANAL menu screen (MODULATION ANALYSIS), modulation analysis numeric display, shown in Fig. 7 below is obtained.

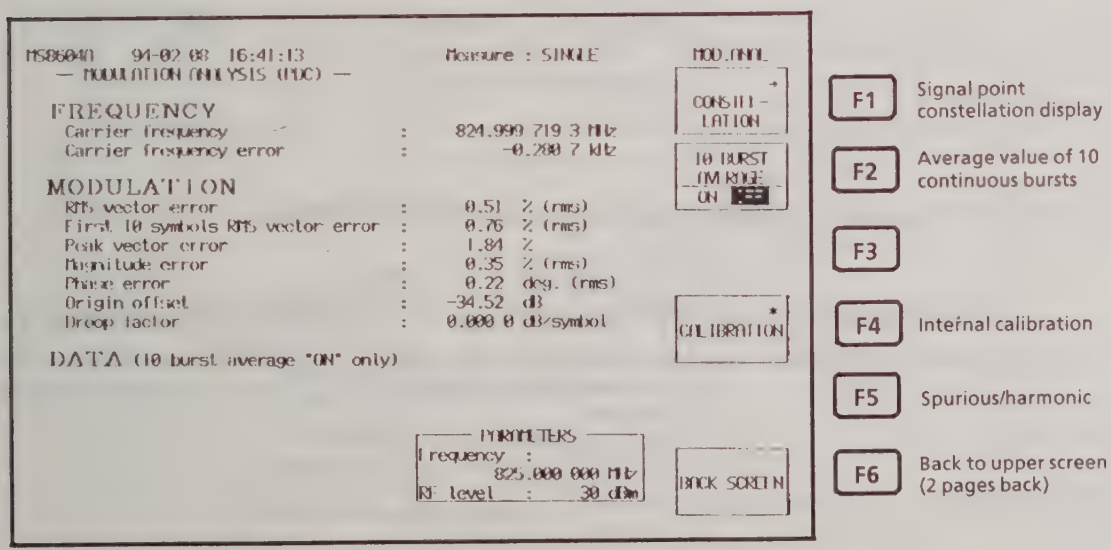


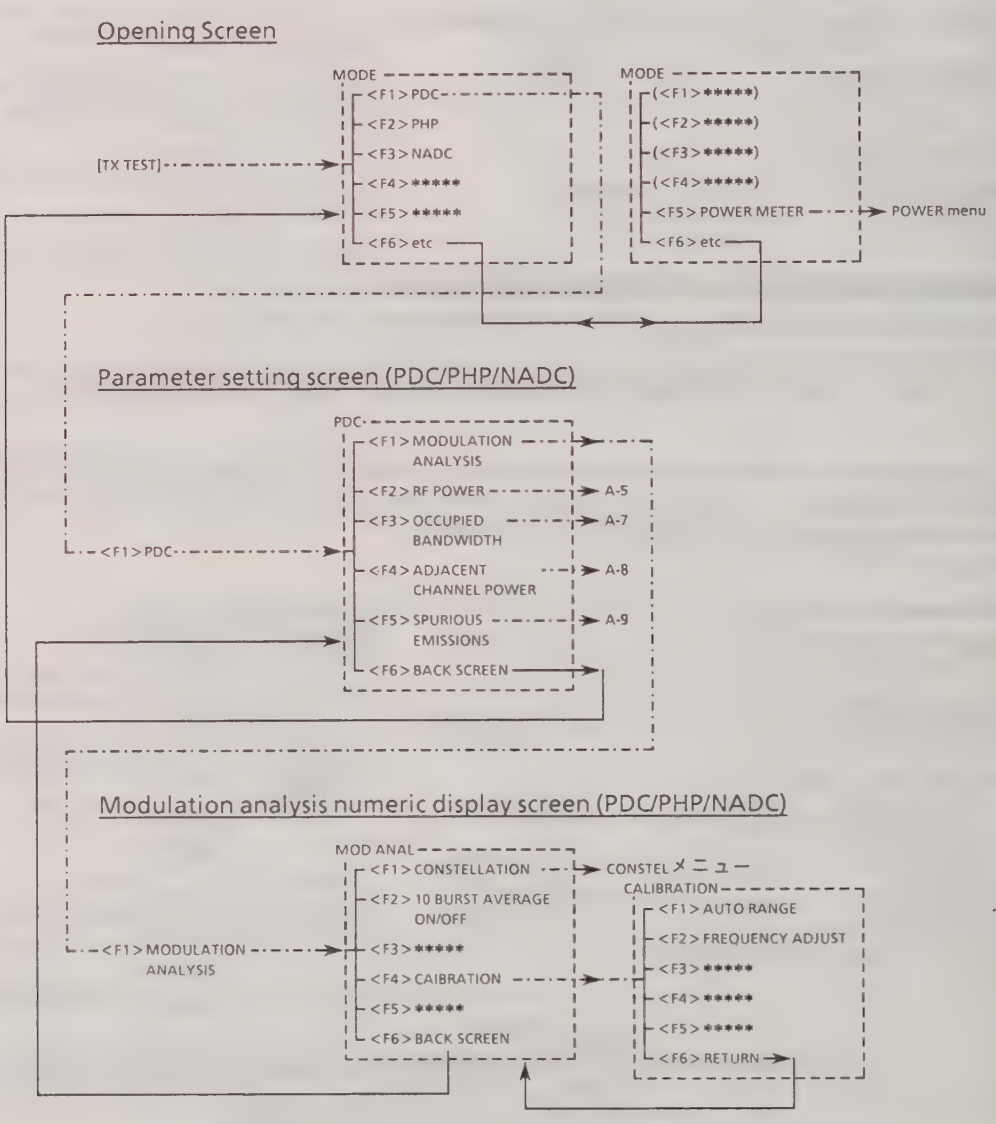
Fig. 7 Modulation Analysis Numeric Display MOD. ANAL Menu Screen

Note: In Figs. 6 and 7, when the [BACK SCREEN: F6] soft key is pressed, the screen goes back by 1 page. That is,

- When the [BACK SCREEN: F6] soft key of the PDC menu in Fig. 6 is pressed, the screen goes back to the measurement system to be tested selection MODE menu.
- When the [BACK SCREEN: F6] soft key of the MOD. ANAL menu in Fig. 7 is pressed, the screen goes back to the system measurement set-up parameter PDC menu.

When the F6 soft key label display is RETURN, if the [RETURN: F6] soft key is pressed, the screen does not change but the menu list only changes to that of 1 page back.

Screen and function key menu transition from the opening screen is shown below.



In the Modulation analysis numeric display MOD. ANAL screen shown in Fig. 7, when the [CONSTELLATION: F1] soft key is pressed, the constellation display CONSTEL menu screen is displayed as shown in Fig. 8.

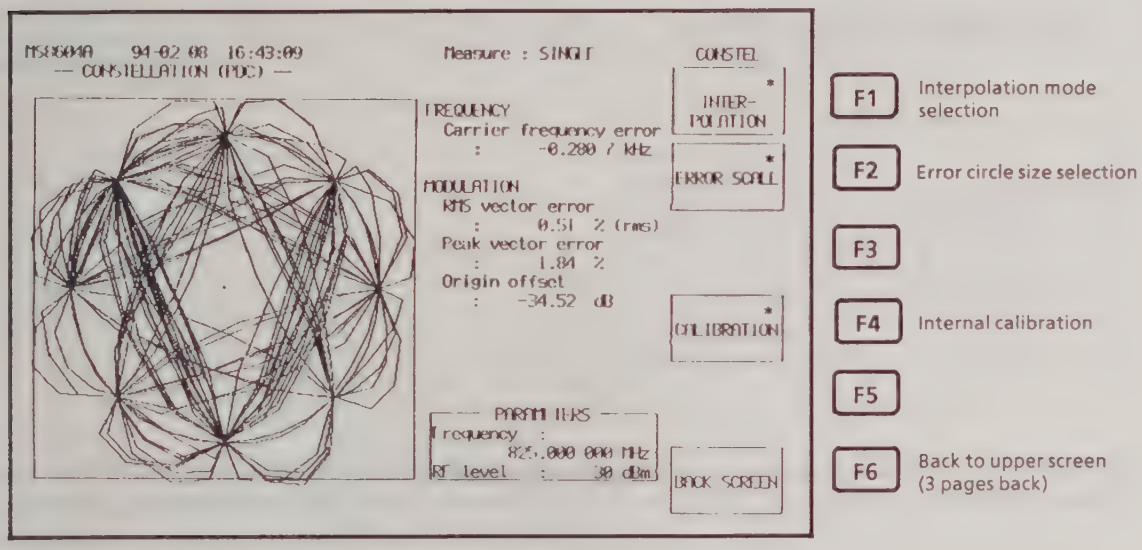


Fig. 8 Constellation Display CONSTEL Menu Screen

Confirm that when the Single key on the MS8604A mainframe is pressed on the constellation display CONSTEL menu screen, constellations are drawn correctly. The preparation before program execution is then completed.

Keep in mind that if a sweep mode is not set to Single, the correct results may not displayed.

If the constellation is not drawn correctly, check the input parameter values of the system measurement set-up parameter on the PDC menu screen in Fig. 6 again.

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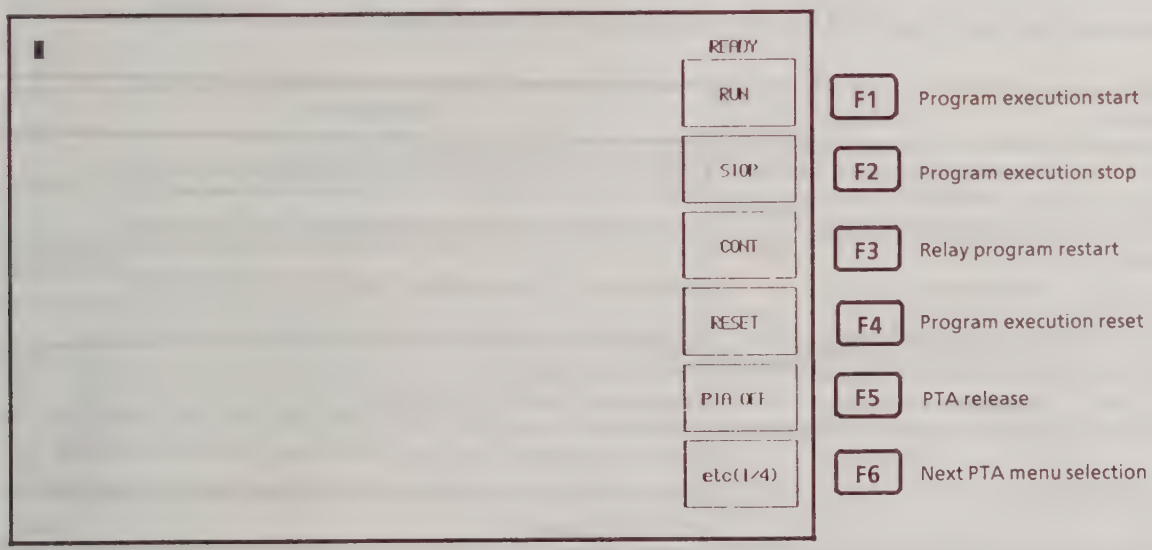
SECTION 3
DETAILS OF MEASUREMENT ITEMS

After completing the preparation before program execution, press the PTA key on the MS8604A front panel to turn the PTA on.

When the PTA is ON, the PTA etc (1/4) menu, the same as in Fig.1, is displayed. However, the MX3512A $\pi/4$ DQPSK analysis software is already installed in the PTA memory by preparation before program execution.



PTA etc (1/4) Menu Screen

Press the [RUN: F1] soft key on the above PTA etc (1/4) menu screen and the measurement item SELECT menu screen is displayed. (See Fig. 9 on next page)

In the measurement item SELECT menu screen shown in Fig.9, the soft keys [F1] to [F6] correspond as follows.

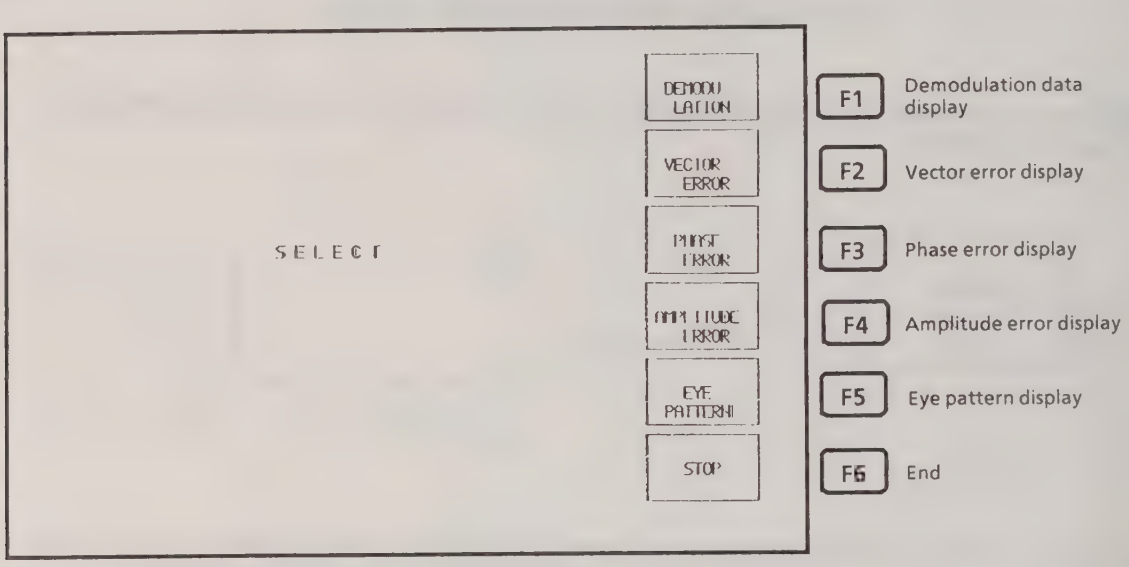
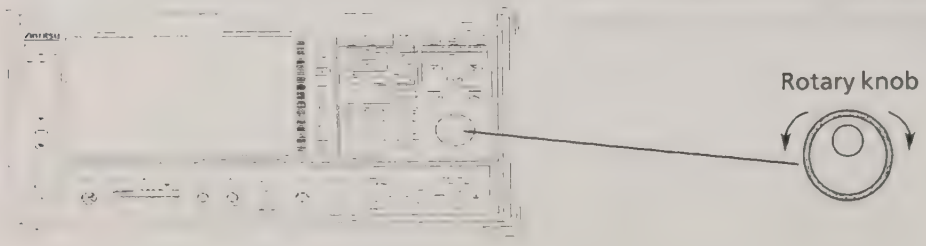


Fig. 9 Measurement Item SELECT Menu Screen

Press a soft key according to the measurement item to be executed from the above SELECT menu.

Soft key	Function	Explanation
F1	Demodulation data display	1slot of data is demodulated and displayed on the screen.
F2	Vector error display	Vector error VS symbols are displayed on the screen.
F3	Phase error display	Phase error VS symbols are displayed on the screen.
F4	Amplitude error display	Amplitude error VS symbols are displayed on the screen.
F5	Eye pattern display	Eye pattern I or Q is displayed.
F6	End	Program execution ends, and the screen returns to the one shown in Fig. 1. If the [PTA OFF: F5] soft key is pressed here, PTA is released.

Note: Do not move the rotary knob while a screen is being changed. If it is moved, the F6 key may operate incorrectly. If the key does not operate correctly, press the [PTA OFF: F5] soft key to release the PTA. Then turn the PTA on again and press the [RUN: F1] soft key to execute again.



3.1 Demodulation Display

In Fig. 9, measurement item SELECT menu screen, when the [DEMODULATION: F1] soft key is pressed, DEMODULATION (character) is displayed in the center of the screen, and within a short time, 1 slot of data is demodulated and displayed on the screen as shown in Fig. 10, DEMODULATION menu screen.

The function keys in Fig. 10 on the screen shown in Fig. 10 correspond as shown below. Underlines on the screen shows positions of sync words.

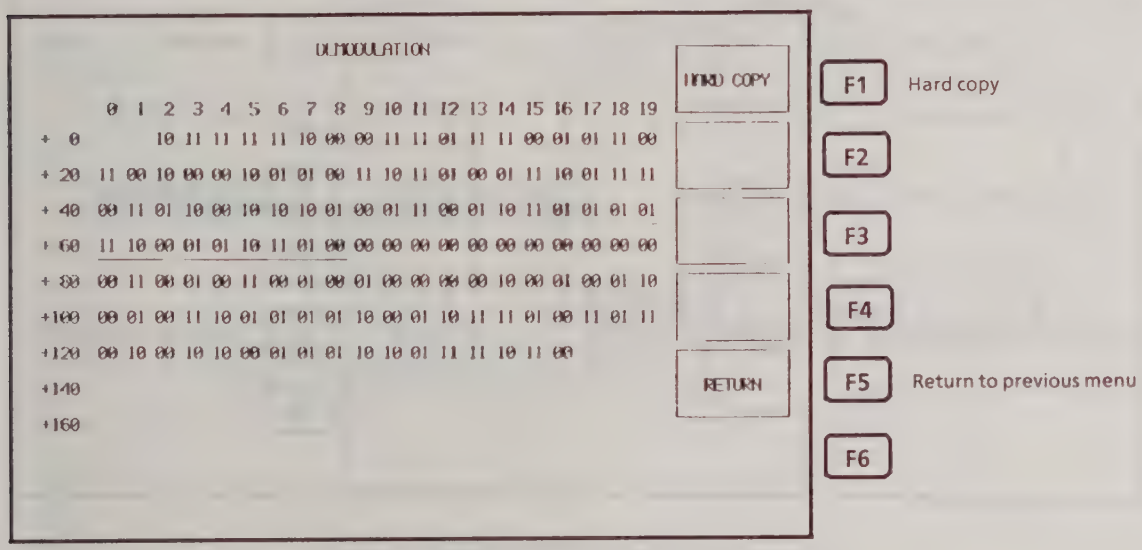


Fig. 10 DEMODULATION Menu Screen

Select measurement item to be tested from the above DEMODULATION menu screen, and press the corresponding soft key.

F1	Screen hard copy can be made. Before taking a hard copy, specify printer setting in advance. Press the F1 key to take a hard copy.
F2	
F3	
F4	
F5	Quits from the DEMODULATION menu screen and returns to the measurement SELECT menu screen shown in Fig. 9.
F6	

3.2 Vector Error Display

In the Measurement Item SELECT Menu Screen shown in Fig. 9.1, when the [VECTOR ERROR: F2] soft key is pressed, VECTOR ERROR (character) is displayed in the center of the screen, and within a short time, vector errors corresponding to the symbols of 1 slot are displayed as shown below in Fig.11 VECTOR ERROR menu screen.

The screen shown in Fig. 11 shows the correspondence of the function keys.

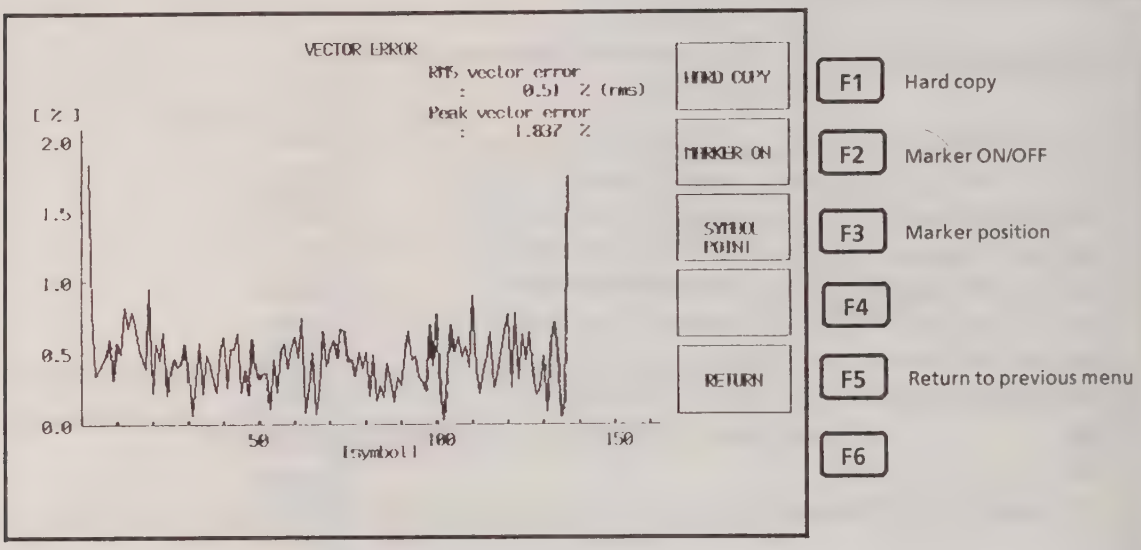


Fig. 11 VECTOR ERROR Menu Screen

Select the measurement item to be tested from the above VECTOR ERROR menu screen, and press the corresponding soft key.

F1	A screen hard copy can be made. Before taking a hard copy, specify the printer setting in advance. Press the F1 key to take a hard copy.
F2	Display and erasure of the marker is done. When the marker is not displayed, "MARKER ON" is indicated. Press the F2 key to display the marker. When the marker is displayed, then "MARKER OFF" is displayed. Press the F2 key to erase the marker.
F3	The marker position can be determined by pressing this key, and then by entering symbol points from the MS8604A mainframe ten keys. If the input values are smaller than that of the lamp up symbol point, then the value of the lamp up symbol point is assumed to be entered. If the input values are larger than that of the lamp down symbol point, the value of the lamp down symbol point is assumed to be entered. If the Enter key only is pressed without operating the ten keys, enter the value again.
F4	
F5	Quits from the VECTOR ERROR menu screen , and returns to the measurement item SELECT menu screen shown in Fig. 9.
F6	

3.3 Phase Error Display

In the measurement item SELECT menu screen shown in Fig. 9, when the [PHASE ERROR: F3] key is pressed, PHASE ERROR (character) is displayed in the center of the screen, and within a short time, phase errors corresponding to the symbols of 1 slot are displayed as shown below in Fig.12, PHASE ERROR menu screen.

The screen shown in Fig. 12 shows the correspondence of the function keys.

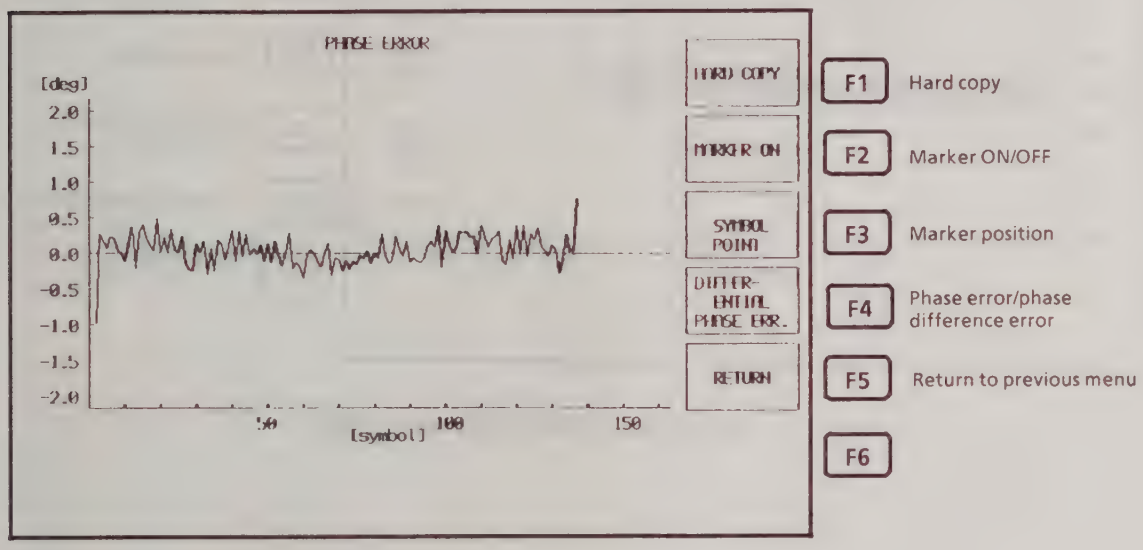


Fig. 12 PHASE ERROR Menu Screen

Select measurement item to be tested from the above PHASE ERROR menu screen, and press the corresponding soft key. The function keys are the same as for the VECTOR ERROR menu screen except for F4 and F5.

F1	A screen hard copy can be made. Before taking a hard copy, specify the printer setting in advance. Press the F1 key to take a hard copy.
F2	Display and erasure of the marker is done. When the marker is not displayed, "MARKER ON" is indicated. Press the F2 key to display the marker. When the marker is displayed, then "MARKER OFF" is displayed. Press the F2 key to erase the marker.
F3	The marker position can be determined by pressing this key, and by entering the symbol points from the MS8604A mainframe ten keys. If the input values are smaller than that of the lamp up symbol point, then the value of the lamp up symbol point is assumed to be entered. If the input values are larger than that of the lamp down symbol point, the value of the lamp down symbol point is assumed to be entered. If the Enter key only is pressed without operating the ten keys, enter the value again.
F4	Switches a phase error display and a phase difference error. When the phase error is displayed, "PHASE ERROR" is indicated. By pressing this key, the phase error is displayed. When the phase difference error is displayed, "DIF PHASE ERROR" is shown. Press this key to display the phase difference error.
F5	Quits from the PHASE ERROR menu screen , and returns to the measurement item SELECT menu screen shown in Fig. 9.

Fig. 13 shows the phase difference error, an example of DIF PHASE ERROR, menu screen.

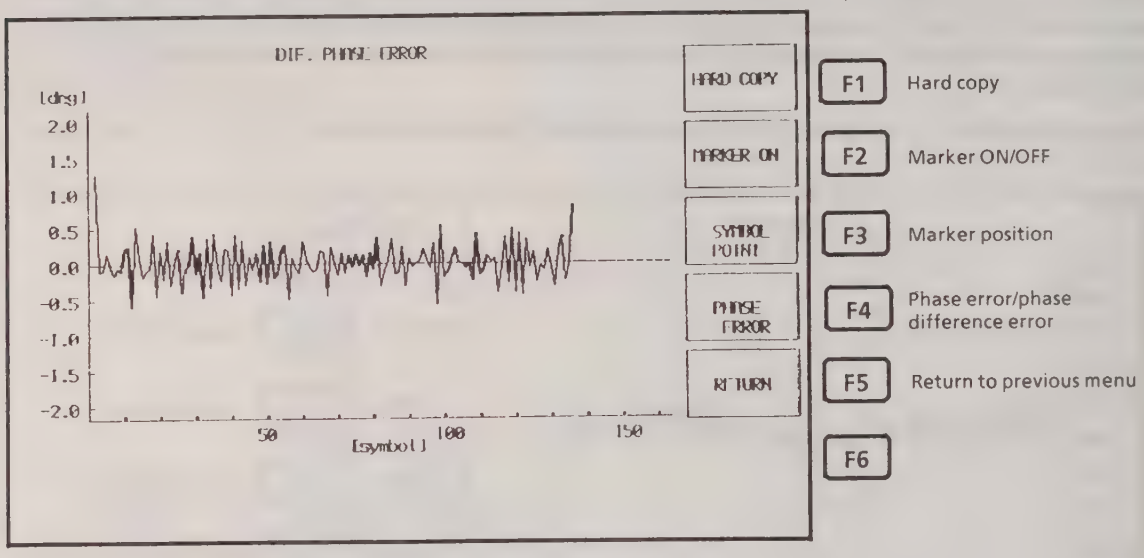


Fig. 13 DIF PHASE ERROR Menu Screen

3.4 Amplitude Error Display

In the measurement item SELECT menu screen shown in Fig. 9, when the [AMPLITUDE ERROR: F4] key is pressed, AMPLITUDE ERROR (character) is displayed in the center of the screen, and within a short time, amplitude errors corresponding to the symbols of 1 slot are displayed as shown below in Fig.14 AMPLITUDE ERROR menu screen below.

The screen shown in Fig. 14 shows the correspondence of the function keys.

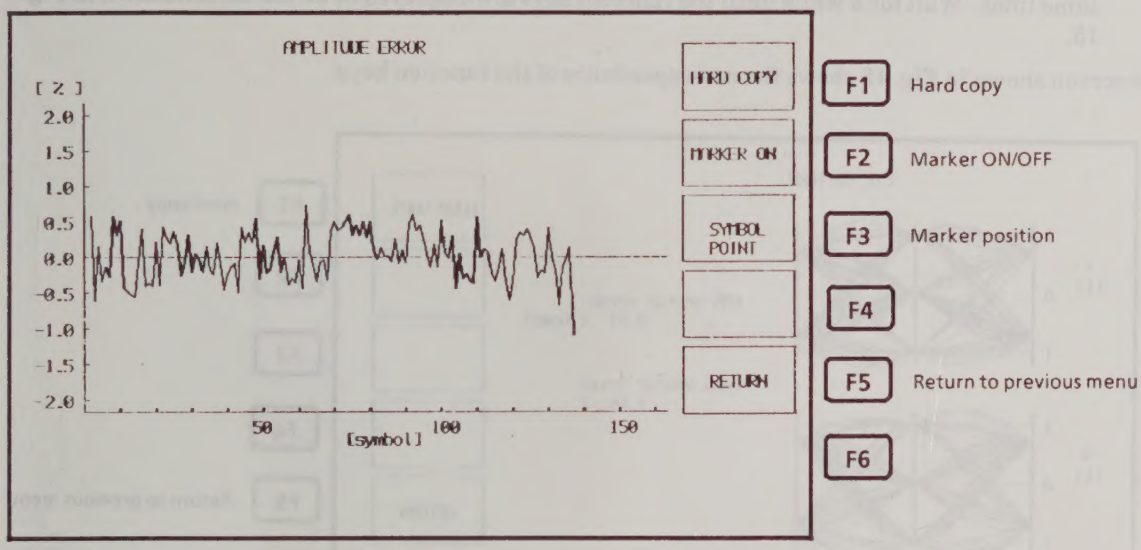


Fig. 14 AMPLITUDE ERROR Menu Screen

Select the measurement item to be tested from the above AMPLITUDE ERROR menu screen, and press the corresponding soft key.

F1	A screen hard copy can be made. Before taking a hard copy, specify the printer setting in advance. Press the F1 key to take a hard copy.
F2	Display and erasure of the marker is done. When the marker is not displayed, "MARKER ON" is indicated. Press the F2 key to display the marker. When the marker is displayed, then "MARKER OFF" is displayed. Press the F2 key to erase the marker.
F3	The marker position can be determined by pressing this key, and by entering the symbol points from the MS8604A mainframe ten keys. If the input values are smaller than that of the lamp up symbol point, then the value of the lamp up symbol point is assumed to be entered. If the input values are larger than that of the lamp down symbol point, the value of the lamp down symbol point is assumed to be entered. If the Enter key only is pressed without operating the key operation, enter the value again.
F4	
F5	Quits from the PHASE ERROR menu screen , and returns to the measurement item SELECT menu screen shown in Fig. 9.
F6	

3.5 Eye Pattern Display

In the measurement item SELECT menu screen shown in Fig. 9, when the [EYE PATTERN: F5] is pressed, "EYE PATTERN" is shown at the center of the screen. Both I and Q eye patterns are displayed at the same time.

When the eye pattern is selected, patterns are drawn immediately, and it takes a while.

Note: The drawing may seem to be stopped mid-way, but this is when the drawing is repeated over the same lines. Wait for a while until the function keys are displayed as on the screen shown in Fig. 15.

The screen shown in Fig. 15 shows the correspondence of the function keys.

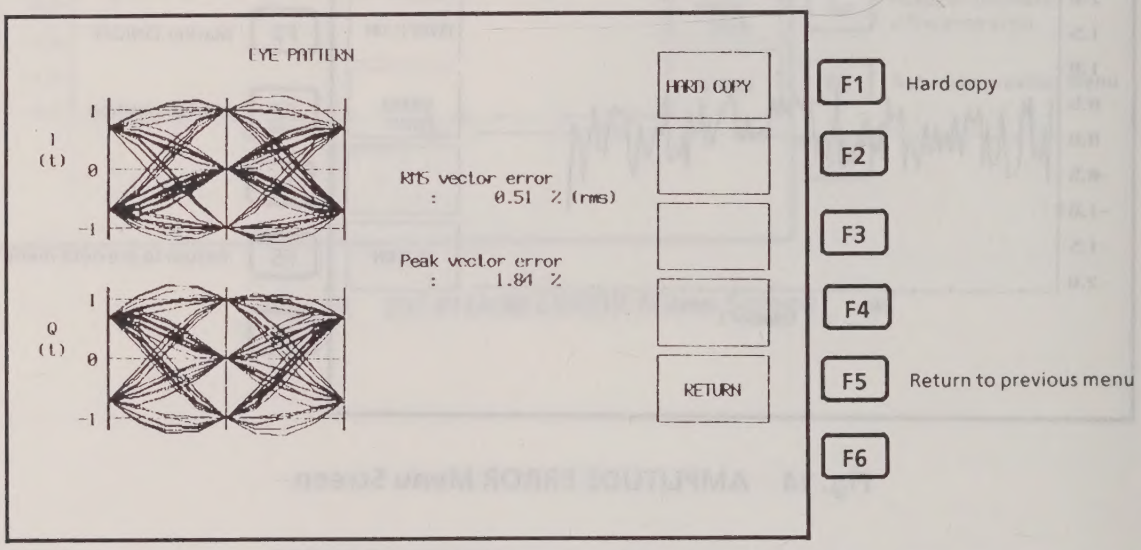


Fig. 15 EYE PATTERN Menu Screen

Select measurement item to be tested from the above AMPLITUDE ERROR menu screen, and press the corresponding soft key.

F1	A screen hard copy can be made. Before taking a hard copy, specify the printer setting in advance. Press the F1 key to take a hard copy.
F2	
F3	
F4	
F5	Quits from the EYE PATTERN menu screen , and returns to the measurement item SELECT menu screen shown in Fig. 9.
F6	

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